

INSTRUCTION MANUAL

BA214 AC/DC Buffer Amplifier



8626 Wilbur Avenue

Northridge, California 91324-4498

(818) 886-2057 • Telex 65-1303

TOLL FREE (800) 423-5851 (AK/CA use (818) number)

AUTOMATIC FAX (818) 886-6512

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1.0 DESCRIPTION

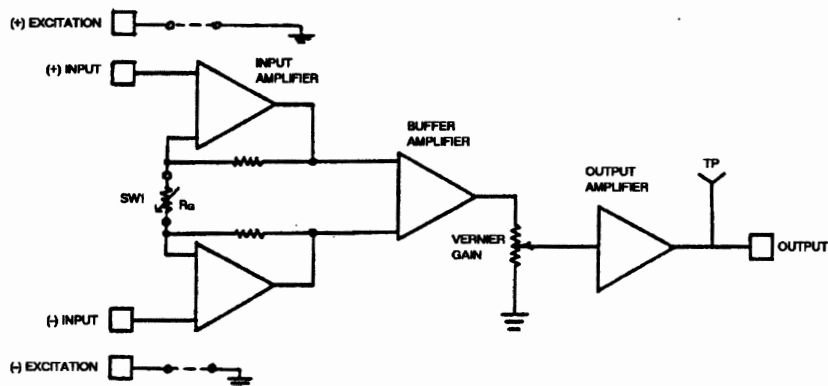
The BA214 is a signal conditioning amplifier plug-in module for the MCI70 Modular Transducer Control System. It provides a high impedance differential or single-ended input for AC and DC signals and a low impedance, single-ended DC output.

Overall gain of 1X to 500X is obtained by setting the SW1 gain range switch. A gain vernier adjustment is provided on the front panel which allows continuous adjustment from 10% to 110% of the gain step determined by Rg.

Other design features include:

- a. Provision for up to 10 Vdc potentiometer transducer excitation voltage, with current limiting for short circuit protection, (Voltage level factor adjustable to meet specific application needs.)
- b. Output voltage linear to beyond ±12 volts typical.
- c. Alternate input connections to provide signal ground points for differential or single-ended input mode.

1.1 FUNCTIONAL BLOCK DIAGRAM



2.0 SPECIFICATIONS

Input :	±12V max; will not be damaged by momentary application of 115V	
Gain Selection		Max. Diff. Input
1.0		10V
10.0		1V
100.0		0.1V
500.00		0.02V

Input Impedance: 22 megohms, each input to circuit ground

Gain: 1, 5, 10, 50, 100, or 500 selected by SW1.

Gain Vernier: Provides 10%-110% adjustment at each gain setting by 20-turn pot.

Output ±10V maximum

Max. load for 10V nominal output: 6K Ω min.

Max. load for 1V nominal output: 200 Ω min.

Output Impedance: Less than 10 Ω

Output Filter: Flat, DC to 200 Hz (available to 10 KHz).

Offset Voltage: Adjustable to zero

Input Bias Current: 0.02 μ A typical each input

Potentiometer Excitation: Up to 10Vdc, current limiting for short-circuit protection

Temperature

Range: 0°F to 150°F

Zero Shift: ±20 μ V/°F referred to input

Span Shift: 0.005%/°F

Power: ±15 Vdc, 6 mA (Supplied by Module Case)

Size: 2.76"H X 0.45"W X 7.5"D
(7.01 X 1.14 X 19.05cm)

3.0 OPERATION**3.1 INSTALLATION**

The BA214 may be plugged into any open channel position of the MCI70 module case. The module may be plugged in or removed while power is "on" without damage or effect on adjacent channels.

3.2 INPUT/OUTPUT CONNECTIONS**3.2.1 MCI70 CASE (Wire-wrap Terminals)**

Input and output connections to the BA214 module are via the printed circuit board connectors mounted on the rear panel of the MCI70 module case. Figure 3-1 shown pin connections for wire wrap terminal type connectors.

3.2.2 MCI70T CASE (SCREW TERMINALS)

For a differential signal input, the BA214 must be used in an MCI70T module slot with terminals wired per Option A. For a single ended input, the BA214 can be used in MCI70T slots wired per Option A or Option B. Figure 3-1 shows the screw terminal connections.

3.2.3 MC170-32 AND MC170-X MODULE CASE

See respective instruction manuals for correct input wiring configuration.

3.2.4 DIFFERENTIAL OR SINGLE-ENDED INPUT MODES

The BA214 module contains board-mounted bifurcated terminals for field wiring to accommodate either single-ended or differential input modes. See Figure 1-1 for location and identification of terminals referenced below.

Differential Input Mode:

Input connections for operation in the differential mode are as shown in Figure 3-1.

Single-Ended Input Mode:

Connections per Figure 3-1 except jumper is added between terminals E5 and E6. In this arrangement, the (-) input pin becomes the input signal ground connection.

3.3 GAIN RESISTOR(RG) SELECTION

The front panel selector switch SW1 selects an appropriate resistor between terminals E1 and E2.

To determine the appropriate resistor value for specific gain requirement, the following relationship is used:

$$R_g = \frac{4.98 \times 10^4}{G-1}$$

Where, R_g = Fixed resistor value, in Ohms

G = desired overall gain

4.0 WARRANTY AND REPAIR POLICY

WARRANTY

VALIDDYNE ENGINEERING CORPORATION warrants equipment of its own manufacture to be free from defects in material and workmanship under normal conditions of use and service. **VALIDDYNE** will repair or replace any component found to be defective on its return to **VALIDDYNE** within the time specified below:

1. Pressure Transducers and Pressure Transmitters (including transducers supplied as part of Digital Manometer Systems) within (3) years of its original purchase.
2. Electronic products (Transducer Indicator, carrier demodulators, plug-in signal conditioners, module cases, etc.) within (1) year of its original purchase.

Buyer is requested to secure authorization of **VALIDDYNE**, and to describe defect prior to return of equipment under warranty. Shipment to **VALIDDYNE** shall be at Buyer's expense, with return at **VALIDDYNE**'s expense. **NON-VERIFIED** problems or malfunctions whether warranty or not are subject to an \$80.00 evaluation charge.

The warranty carries no liability, either expressed or implied, beyond our obligation to repair or replace, at **VALIDDYNE**'s option the unit which carries the warranty to the original purchaser. Prices, specifications and designs subject to change without notice. This warranty is void if the project is subjected to misuse, accident, neglect or improper application, installation or operation.

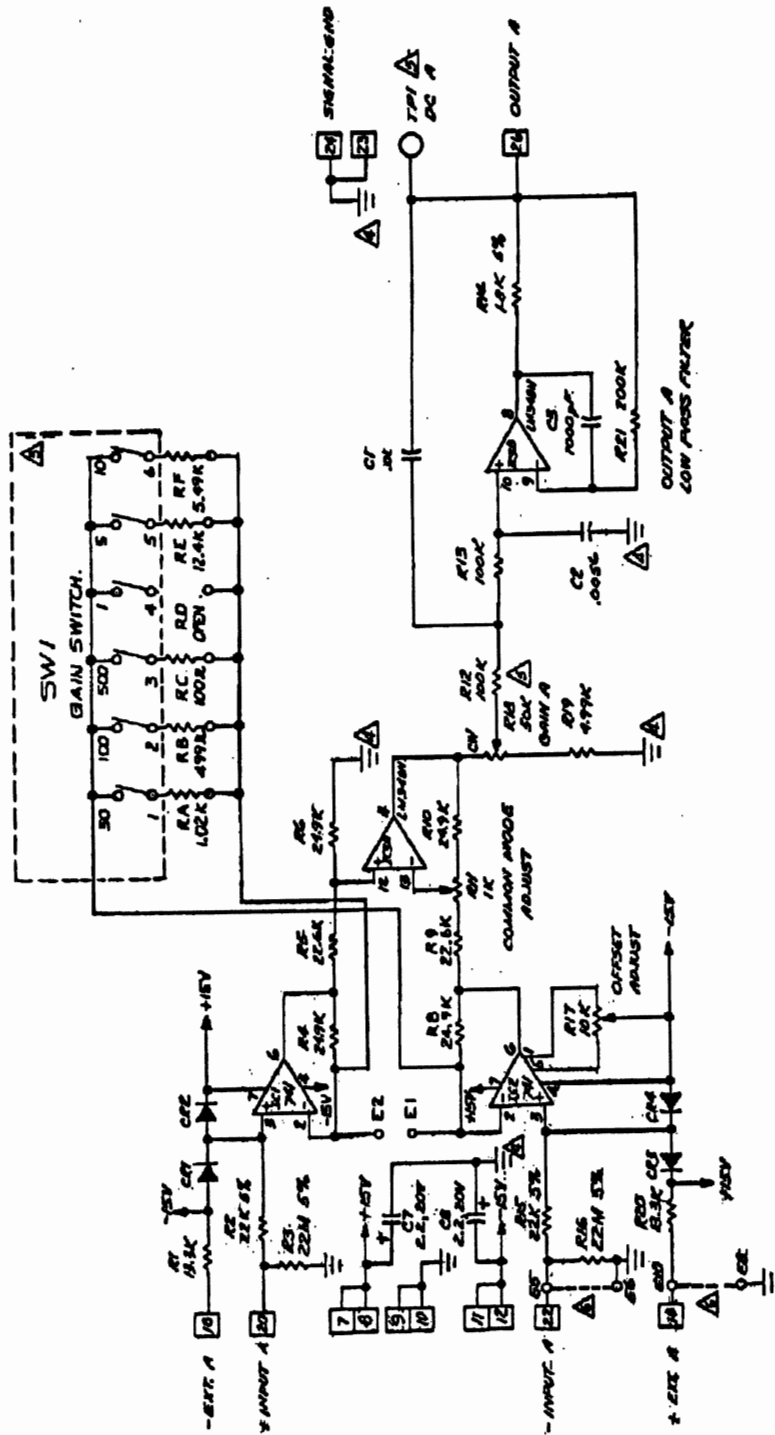
REPAIR POLICY

Units returned to **VALIDDYNE** for repair which are not under warranty will be subject to the following conditions.

1. A description of the problem or malfunction shall accompany the unit returned for repair, or be communicated to **VALIDDYNE** prior to shipment. Otherwise there will be a minimum evaluation and/or calibration charge of \$80.00.
2. Unit will be repaired automatically if charge is less than 65% of current list price unless other specific instructions are received. Above 65% **VALIDDYNE** will request authorization by buyer.
3. If quotation is required before proceeding with repair unit should be accompanied by paper so stating, or information communicated to **VALIDDYNE** prior to shipment.
4. Buyer is to secure authorization and shipping method from **VALIDDYNE** prior to return of equipment or shipment will be rejected. (Applies to Canada only)

REPAIR WARRANTY

Warranty coverage on repairs is 90 days on work done, or to the end of the original warranty period, whichever is longest.



BA214 SCHEMATIC DIAGRAM

- 3 DIODES ARE IN914
- 2 CAPACITOR VALUES ARE IN MICROFARADS
- 1 RESISTOR VALUES ARE IN OHMS ± 1% 1/8W.
- △ JUMPERS ARE AN OPTION
- △ MOUNTED AT FRONT PANEL
- △ SIGNAL GROUND

1.2 ADJUSTMENT AND TEST POINTS

Figure 1-1 shows the relative location and identification of available front panel and printed circuit board mounted adjustment potentiometers, test jacks, and bifurcated terminals referred to elsewhere in this manual. A brief description follows.

1.2.1 Front Panel

Vernier Gain Control (R18)

20 turn (nom.) screwdriver-adjust trimming potentiometer is provided for continuous adjustment of gain from 10% to 110% of the overall gain step established by SW1. Circuit values and tolerances have been selected such that, by use of the appropriate position of SW1 and adjustment of the Vernier Gain Control, any specific overall gain value between 1X and 550X may be precisely established.

DC Test Point

A test jack is provided to allow monitoring of the analog DC output voltage at the front panel of the BA214 Module (used in conjunction with the "GND" jack on the module case front panel). For old style MC170T module cases, the connection appears on the power supply module.

1.2.2 Printed Circuit Board

Off-Set Voltage Adjust (R17)

Single turn, continuous resolution adjustment potentiometer used to balance out DC off-set voltage.

Common Mode Adjust (R11)

Single turn, continuous resolution adjustment potentiometer for maximizing AC or DC common mode rejection.

Offset and Common Mode adjustments are performed at the factory prior to shipment and are not normally required in the field. See also section 3.4 and 3.5.

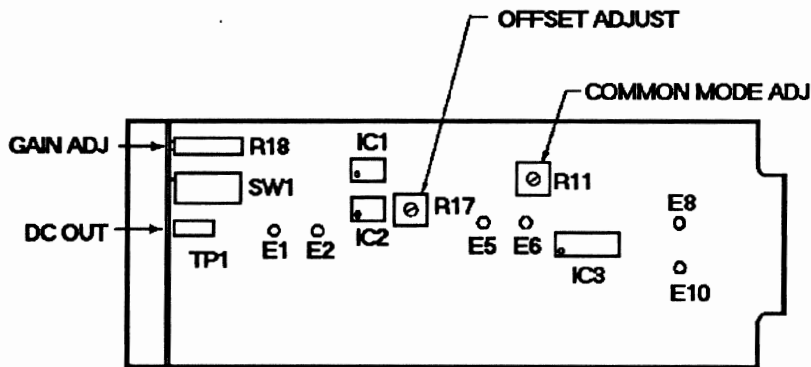


FIGURE 1-1 BA214 ADJUSTMENTS AND TEST POINTS

3.4 DC OFFSET ADJUSTMENT

- a. Short both inputs to system ground. (This may be conveniently done by connecting (+) and (-) input pins and adding jumper between bifurcated terminals E5 and E6.
- b. Connect a digital volt meter to the DC test point and to the "GND" jack on the module case front panel.
- c. Adjust potentiometer R17 for zero reading on DVM. Perform this adjustment at the biggest gain range.

3.5 COMMON MODE ADJUSTMENTS

3.5.1 DC COMMON MODE:

- a. Connect a DC signal source between (+) and (-) input pins in common, and signal ground.
- b. Connect a DVM to the DC test point and MC170 power supply "GND" jack.
- c. While monitoring the DVM output indication, vary the input from plus 10 Vdc to minus 10 Vdc and adjust R11 to obtain a minimum change in output for the input change.

3.5.2 AC COMMON MODE:

Connect an AC signal source, using the same connections as in 3.5.1, above. Monitor the output using a suitable volt meter or oscilloscope. With application of an AC signal of the desired operating frequency, adjust R11 for minimum output.

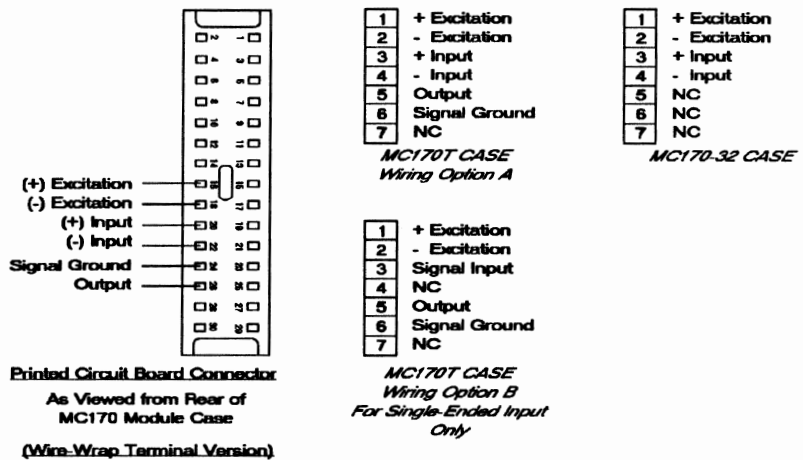
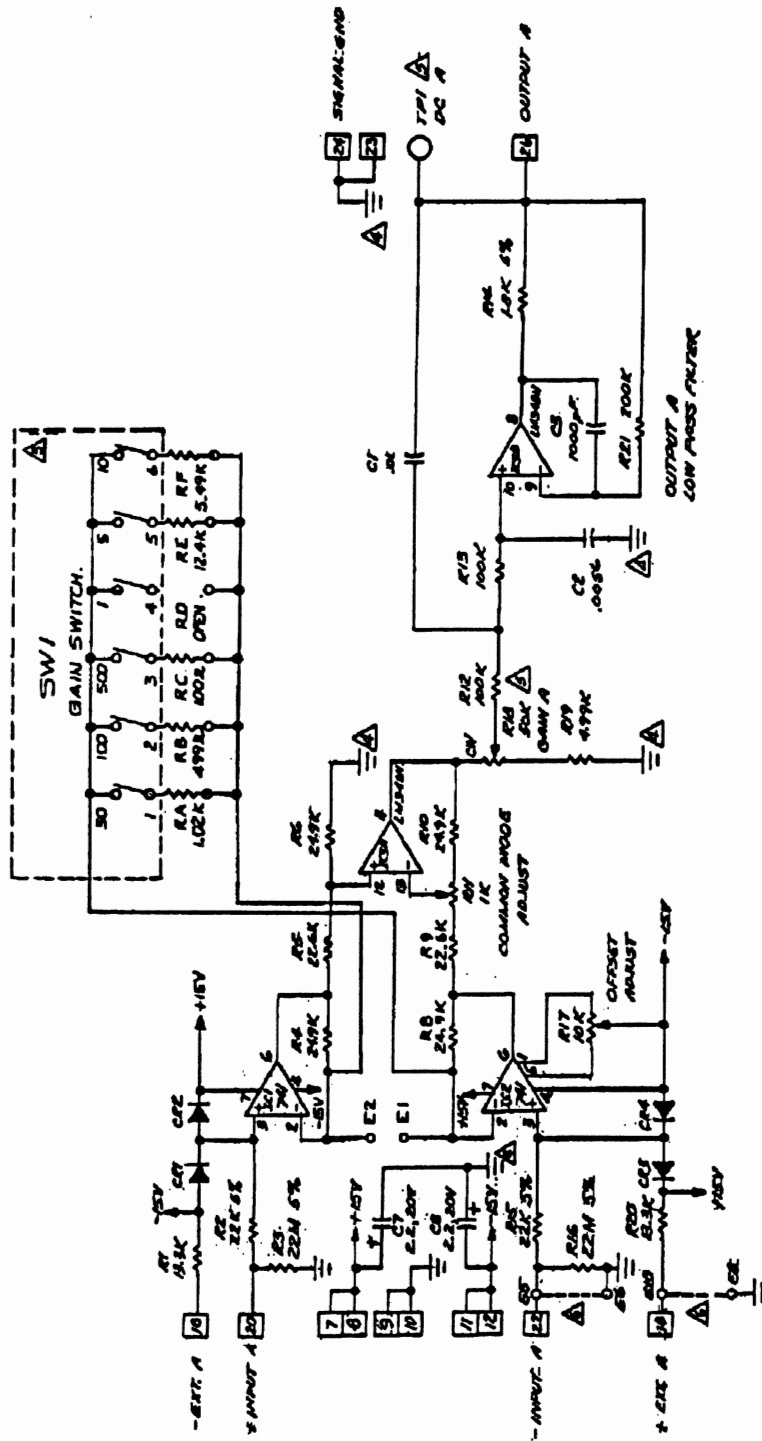


FIGURE 3-1 - INPUT/OUTPUT CONNECTIONS



BA214 SCHEMATIC DIAGRAM

- 3 DIODES ARE IN914
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- ▲ JUMPERS ARE AN OPTION
- ▲ MOUNTED AT FRONT PANEL
- ▲ SIGNAL GROUND

WARRANTY

VALIDYNE ENGINEERING CORPORATION warrants equipment of its own manufacture to be free from defects in material and workmanship under normal conditions of use and service.

VALIDYNE will rework or replace any item found to be defective on as return to VALIDYNE within the time specified below:

1. Pressure Transducers and Pressure Transmitters (including transducers supplied as part of Digital Manometer Systems) within three (3) years of its original purchase.
2. Electronics products (Transducer Indicators, Carrier Demodulators, plug-in SignalConditioners, Module Cases, etc.) within one (1) year of its original purchase.
3. OEM Transducers within one (1) year of its original purchase.

Buyer is requested to secure authorization of VALIDYNE, and to describe defect prior to return of equipment under warranty. Shipment to VALIDYNE shall be at Buyer's expense, with return at VALIDYNE's expense. NON-VERIFIED problems or malfunctions, whether warranty or not, are subject to a \$100.00 evaluation charge.

The warranty carries no liability, either expressed or implied, beyond our obligation to rework or replace, at VALIDYNE's option, the unit which carries the warranty to the original purchaser. Prices, specifications, and designs are subject to change without notice. This warranty is void if the product is subjected to misuse, accident, neglect, or improper application or operation.

Out of Warranty Rework

Units returned to VALIDYNE for rework which are out of warranty will be subject to the following conditions:

1. A description of the problem or malfunction shall accompany the unit returned for rework, or be communicated to VALIDYNE prior to shipment. Otherwise there will be a minimum evaluation and/or calibration charge of \$100.00.
2. Unit will be reworked automatically if the charge is less than 65% of current list price, unless other specific instructions are received. Above 65% VALIDYNE will request authorization by Buyer.
3. If a quotation is required before proceeding with rework, unit should be accompanied by a document so stating, or communicated to VALIDYNE prior to shipment. A \$100.00 evaluation charge will be invoiced for this service.
4. Shipping charges in both directions are the responsibility of the Buyer for all out of warranty returns.

Warranty on Rework

Warranty coverage on rework is 90 days on work done, or to the end of the original warranty period, whichever is longest.



8626 Wilbur Avenue - Northridge, CA - 91324
818-886-2057 - Toll Free 800-423-5851 - Automatic Fax 818-886-6512